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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,770	04/09/2004	Ichiro Koiwa	OK1.651	8824

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EXAMINER

HOANG, QUOC DINH

ART UNIT PAPER NUMBER

2818

DATE MAILED: 03/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/820,770	KOIWA, ICHIRO	
	<b>Examiner</b>	<b>Art Unit</b>	
	Quoc D. Hoang	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 December 0205.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-8, 15, 16 and 18-27 is/are pending in the application.
- 4a) Of the above claim(s) 4-6, 15, 16, 18-22 and 24-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 2, 3, 7, 8, 23 and 27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Amendment filed on 12/23/2005 has been entered. In the Amendment, claims 1, 9-14 and 17 have been cancelled. Claims 20-27 are newly added. Claims 1-8, 15, 16 and 18-27 are pending in the application.

### ***Election/Restrictions***

2. Newly submitted claims 20-22 and 24-26 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the projection electrode and the bottom electrode are made of bismuth do not belong the first embodiment, shown in figure 5 and page 6 line 4 through page 9 line 7.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 20-22 and 24-26 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 7, 8, 23 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato., (US Pat No. 6,284,595) in view of Lu., (US Pat No. 5,679,596).

**Regarding claim 2**, Kato teaches a ferroelectric capacitor comprising:

a bottom electrode 60 (col. 5, lines 17-25 and Fig. 2);

a plurality of projection electrodes 62 formed on the bottom electrode 60 (col. 5, lines 17-25 and Fig. 2);

a ferroelectric layer 52 formed on the bottom electrode 60 and the projection electrodes 62 (col. 4, lines 50-63, col. 5, lines 40-43 and Fig. 2); and

a top electrode 54 formed on the ferroelectric layer 52 (col. 6, lines 64-67 and Fig. 2).

Kato teaches a plurality of projection electrodes 52, but fails to teach wherein spacing between central portions of each projection electrode has a range from 10 % to 20% of a size of the ferroelectric capacitor.

However, Lu teaches wherein spacing between central portions of each projection electrode 14b has a range from 1.5 % to 75% of a size of the ferroelectric capacitor (col. 4, line 50 through col. 5, line 65 and Fig. 5). *It is noted that the size of the ferroelectric capacitor is considered the width (2,000-10,000 Å) of the bottom electrode 11 (col. 4, lines 40-43), the width of the projection electrode 14b is between about 50-500 Å (col. 5, lines 17-18), and the spaces 14a between the projection electrode 14b are between about 100-1000 Å (col. 5, lines 19-21). Hence, after calculating, the spacing between central portions of each projection electrode 14b has a range from 1.5 % to 75% of a size of the ferroelectric capacitor.* Since Kato and Lu are all from the

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same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Kato. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide spacing between central portions of each projection electrode in order to increase the surface area of the bottom electrode, therefore to obtain the desired increased capacitance as taught by Lu, column 5, lines 24 through col. 6, line 3. Although Lu's spacing between central portions of each projection electrode is not the claimed range (10% to 20%), this does not define patentable over Lu since the thickness is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

**Regarding claim 3,** Kato teaches a ferroelectric capacitor comprising:

a bottom electrode 60 (col. 5, lines 17-25 and Fig. 2);

a plurality of projection electrodes 62 formed on the bottom electrode 60 (col. 5, lines 17-25 and Fig. 2);

a ferroelectric layer 52 formed on the bottom electrode 60 and the projection electrodes 62 (col. 4, lines 50-63, col. 5, lines 40-43 and Fig. 2); and

a top electrode 54 formed on the ferroelectric layer 52 (col. 6, lines 64-67 and Fig. 2).

Kato teaches a plurality of projection electrodes 52, but fails to teach wherein a size of each projection electrode has a range from 5 % to 10% of a size of the ferroelectric capacitor.

However, Lu teaches wherein a size of each projection electrode has a range from 0.5 % to 25% of a size of the ferroelectric capacitor (col. 4, line 50 through col. 5,

line 65 and Fig. 5). *It is noted that the size of the ferroelectric capacitor is considered the width (2,000-10,000 Å) of the bottom electrode 11 (col. 4, lines 40-43), the size of each projection electrode is considered the width of the projection electrode 14b, which is between about 50-500 Å (col. 5, lines 17-18). Hence, after calculating, a size of each projection electrode has a range from 0.5 % to 25% of a size of the ferroelectric capacitor.* Since Kato and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Kato. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide spacing between central portions of each projection electrode in order to increase the surface area of the bottom electrode, therefore to obtain the desired increased capacitance as taught by Lu, column 5, lines 24 through col. 6, line 3. Although Lu's size of each projection electrode is not the claimed range (5% to 10%), this does not define patentable over Lu since the thickness is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

**Regarding claim 7,** Kato teaches a ferroelectric capacitor comprising:

a bottom electrode 60 (col. 5, lines 17-25 and Fig. 2);

a plurality of projection electrodes 62 formed on the bottom electrode 60 (col. 5, lines 17-25 and Fig. 2);

a ferroelectric layer 52 formed on the bottom electrode 60 and the projection electrodes 62 (col. 4, lines 50-63, col. 5, lines 40-43 and Fig. 2); and

a top electrode 54 formed on the ferroelectric layer 52 (col. 6, lines 64-67 and Fig. 2).

Kato teaches a plurality of projection electrodes 52, but fails to teach wherein the projection electrodes are arranged evenly spaced on the bottom electrode.

However, Lu teaches wherein the projection electrodes 14b are arranged evenly spaced on the bottom electrode 11 (col. 4, line 50 through col. 5, line 65 and Fig. 5). *It is noted that the evenly spaced between the projection electrodes 14b is the width of the crevice or space 14a (col. 5, lines 19-21).* Since Kato and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Kato. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide spacing between central portions of each projection electrode in order to increase the surface area of the bottom electrode, therefore to obtain the desired increased capacitance as taught by Lu, column 5, lines 24 through col. 6, line 3.

**Regarding claim 8,** Kato teaches the bottom electrode 60 and the projection electrodes 62, but fails to teach wherein the bottom electrode and the projection electrodes are made of a same material.

However, Lu teaches wherein the bottom electrode 11 and the projection electrodes 14b are made of a same material (col. 4, line 41, col. 5, line 13). Since Kato and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Kato. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide same material of

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the bottom electrode and the projection electrodes in order to increase the surface area of the bottom electrode without increasing STC size as taught by Lu, column 6, lines 10-15.

**Regarding claim 23**, Kato teaches the bottom electrode 60 and the projection electrodes 62, but fails to teach wherein the bottom electrode and the projection electrodes are made of a same material.

However, Lu teaches wherein the bottom electrode 11 and the projection electrodes 14b are made of a same material (col. 4, line 41, col. 5, line 13). Since Kato and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Kato. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide same material of the bottom electrode and the projection electrodes in order to increase the surface area of the bottom electrode without increasing STC size as taught by Lu, column 6, lines 10-15.

**Regarding claim 27**, Kato teaches the bottom electrode 60 and the projection electrodes 62, but fails to teach wherein the bottom electrode and the projection electrodes are made of a same material.

However, Lu teaches wherein the bottom electrode 11 and the projection electrodes 14b are made of a same material (col. 4, line 41, col. 5, line 13). Since Kato and Lu are all from the same field of endeavor, the purpose disclosed by Lu would have been recognized in the pertinent art of Kato. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to provide same material of



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the bottom electrode and the projection electrodes in order to increase the surface area of the bottom electrode without increasing STC size as taught by Lu, column 6, lines 10-15.

### **Conclusion**

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quoc Hoang whose telephone number is (571) 272-1780. The examiner can normally be reached on Monday-Friday from 8.00 AM to 5.00 PM.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone numbers of the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Quoc Hoang  
Patent examiner/AU 2818



03/21/2016